

REMARKS

Claims 1-19 are in the case. Claims 1-3, 6-10, 13-16 and 19 were rejected under 35 USC § 103(a) over U.S. Patent Application Publication No. 2002/0135640 to Chen (hereinafter, "Chen") in view of U.S. Patent Application Publication No. 2002/0113846 to Wang et al. (hereinafter, "Wang"). Claims 5, 12, and 18 were rejected under 35 USC § 103(a) over Chen and Wang, and further in view of U.S. Patent No. 5,861,902 to Beerling (hereinafter "Beerling"). Claims 4, 11, and 17 were objected to as being dependent upon a rejected base claim.

Applicants greatly appreciate the courtesies of the telephone interview conducted on April 19, 2007, between the undersigned attorney, the examiner and the examiner's supervisor. During the interview, applicants pointed out that the combined references fail to provide all the elements of the claimed invention, and there is no motivation to combine the references. The substance of the interview is contained in this response.

Specifically during the interview, applicants asserted that none of the references teach, suggest or disclose etching through the entire thickness of an already present dielectric layer to form a fluid supply slot. The examiner's supervisor indicated that the Chen reference may have been misapplied in this case.

Applicants also pointed out that both elements of the Markush group of claim 1 were found by the inventors to provide an improvement in DRIE etching characteristics.

Applicants asserted that not only do none of the references alone, or in combination provide all of the elements of the claimed invention, but the cited references also do not recognize the problem of device side damage or propose a method for reducing device side damage when etching the substrate from the device side. Thus the rejections should be withdrawn.

The Applicants sincerely appreciate the examiner noting that claims 4, 11, and 17 would be allowable if rewritten in independent form including the limitations of the base claim and any intervening claims. The Applicants respectfully traverse the Examiner's

rejections of claims 1-3, 5-10, 12-16, and 18-19 under 35 USC § 103(a). Reconsideration and allowance of the claims are requested.

A. Claims 1-3, 5-10, 12-16 and 18-19 are Patentably Distinguished Over the Cited References.

As previously described, claims 1-3, 5-10, 12-16 and 18-19 are directed to substrates 42 (FIGS. 7-8) for micro-fluid ejection devices having characteristics that provide improved formation of fluid flow paths (40) through the substrates (42). A deep reactive ion etching process is used to form the fluid flow paths through the substrate due to the thickness of the substrate and the length of the path through the substrate. By providing an etching location in the substrate that has not more than 5000 Angstroms thickness of a dielectric layer or a root mean square depth of surface pitting of less than about 500 Angstroms, improved fluid flow paths may be formed by the deep reactive ion etching process and cycle times for forming the flow paths may be significantly reduced. Thus applicants have recognized a problem with conventional deep reactive ion etching processes for fluid flow paths through the thickness of the substrate and have provided a novel solution to the problem.

The MPEP outlines three conditions that must be met for a *prima facie* case of obviousness to be made out. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the combined references must provide all the claim limitations. The asserted arguments against the Applicants have failed at least the first and third of these criteria.

It appears that the examiner may have completely misread the Chen et al. reference which is only directed to fabricating a fluid-jet printhead having a consistent turn on energy to fire a fluid droplet, rather than providing a method for etching the substrate to provide fluid paths through a substrate. Chen also fails to teach, suggest or disclose etching a **substrate** using dry etching or deep reactive ion etching. More importantly, the Chen references fails to teach, suggest, disclose etching fluid paths

through a substrate that has the particular surface characteristics required by the claims of the present application.

The dielectric layer referred to in Chen paragraph [0034] is patterned to define a resistor area, and is deposited on top of an insulating layer that was previously deposited on the substrate. No etching is conducted through the dielectric material 44 and through insulating layer 20 and substrate 10 of Chen. Therefore it is improper to use the Chen reference for providing the elements of the claimed invention.

The Wang reference is cited merely for teachings relating to etching a substrate using a deep reactive ion etching process. However, like Chen, the Wang reference fails to recognize the problem associated with deep reactive ion etching process cycle times and fails to propose a solution to the problem. There is nothing in the Wang reference that suggests there is any advantage to providing a passivation layer of no more than 5000 Angstroms as called for in the claims or the advantages of providing such a limited dielectric layer thickness. According to Wang, the passivation layers 18 and 20 can have any thickness ranging from 1000 to 100,000 Angstroms. Clearly, Wang fails to recognize the advantage of dry etch cycle time provided by the limited dielectric thickness provided by the claimed invention.

Accordingly, even if the Wang reference is combined with Chen as suggested by the examiner, the combined references fail to provide all the elements of the claimed invention. The combined references fail to teach, suggest, or disclose etching the substrate to form fluid paths therethrough or etching a substrate having the particular surface characteristics claimed.

Furthermore, it is improper to combine the Wang reference with the Chen reference to reject the claims. Proper motivation must be found in order to make the selection and combination of prior art elements in the cited references. The Chen reference is directed to etching layers on a substrate to provide a resistor structure and the Wang reference is directed to forming pressurizing chambers 22 for piezoelectric devices. Accordingly, the Chen reference and the Wang reference are directed to divergently different ejection head structures. Etching the substrate in Wang to form

fluid chambers does not suggest etching the dielectric layer in Chen to provide the heater resistor. The examiner is challenged to find motivation in the references to make the combination.

Applicants assert that without the proper motivation, the combination of references is improper and thus the combined references do not render the claims obvious. As noted above, the mere fact that various elements *could be* placed in combination is not a sufficient motivation for actually making the combination. An infinite number of different elements *could be* placed in combination, but in order to make the present combination obvious, there must be explicit motivation in the references to make the combination.

There is nothing in the prior art cited to lead a person of ordinary skill to design an apparatus like that of the present invention, other than the hindsight knowledge of this invention. The office action recites certain generalized benefits (realized in hindsight after considering the invention) as motivation for the combination of the references. **The motivation to combine references cannot come from the invention itself.** See *In re Oetiker*, 24 U.S.P.Q.2D 1443, 1446. The claims of the present application appear to have been used as a frame, and individual parts of separate prior art references were employed to recreate a facsimile of the claimed invention. See *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 312. There is no explanation of what there was in the prior art that would have caused those skilled in the art to combine the references.

The Examiner has the burden to show some teaching or suggestion in the references to support their use in the particular claimed combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 5 U.S.P.Q.2D at 1438-1439. In the apparent absence of such teaching or suggestion, applicants respectfully suggest that the references are improperly combined.

Claims 5, 12, and 18 also stand rejected under 35 USC103(a) as being unpatentable over Chen and Wang, and further in view of Beerling. However, the combination including Beerling fails to compensate for the deficiency of Chen and Wang to provide all the elements of the present claims. As set forth in applicants' previous response filed December 28, 2006, the Beerling reference also fails to teach, suggest, or disclose etching the substrate 12 with a deep reactive ion etching process or forming fluid

paths through the substrate having the particularly claimed surface characteristics. According, the combination of Chen, Wang, and Beerling fails to provide all

Dependent claims 2, 3, 5-7, 9, 10, 12, 13, 15, 16, and 18-19 depend from independent claims 1, 8, and 14, and contain additional important aspects of the invention. Therefore, dependent claims 2, 3, 5-7, 9, 10, 12, 13, 15, 16, and 18-19 are patentable over Chen in view of Wang (and Beerling) for the same reasons claims 1, 8, and 14 are patentable over Chen in view of Wang (and Beerling). Reconsideration and allowance of dependent claims 2, 3, 6-7, 9, 10, 13, 15, 16, and 19 are respectfully requested.

B. THE OBJECTION TO CLAIMS 4, 11 AND 17 HAS BECOME MOOT.

Dependent claims 4, 11, and 17 depend from independent claims 1, 8, and 14, and contain additional important aspects of the invention. Therefore, dependent claims 4, 11, and 17 are patentable over Chen in view of Wang for the same reasons claims 1, 8, and 14 are patentable over Chen in view of Wang. Reconsideration and allowance of dependent claims 4, 11, and 17 are respectfully requested.

CONCLUSION

Applicants assert that the claims of the present application patentably define over the prior art made of record and not relied upon for the same reasons as given above. Applicants respectfully submit that a full and complete response to the office action is provided herein, and that the application is now fully in condition for allowance. Action in accordance therewith is respectfully requested.

In the event this response is not timely filed, applicants hereby petition for the appropriate extension of time and request that the fee for the extension be charged to deposit account 12-2355. If other fees are required by this amendment, such as fees for additional claims, such fees may be charged to deposit account 12-2252.

Respectfully submitted,

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